

The Cometary Cloud: Ought There Be One?

Paul R. Weissman (Jet Propulsion Laboratory)

Oort (1950) first proposed that the solar system was surrounded by a vast cloud of comets extending to interstellar distances. Orbital data and dynamical simulations over the past half century have confirmed the existence of the Oort cloud and allowed us to learn much about its complex dynamics as well as its likely population. The basic paradigm for the origin of the Oort cloud is that the comets are icy planetesimals, dynamically ejected from the giant planets zone during and immediately after planetary formation (Kuiper, 1951). In recent years researchers have begun to study the details of that paradigm and have recognized several challenging problems. This talk will examine the most recent work and discuss the new questions that need to be answered about the formation and evolution of the Oort cloud. Topics to be discussed will include: 1) dynamical simulations of the ejection of icy planetesimals in the early solar system (Dones et al., BAAS, 2000), 2) the collisional evolution of planetesimals during the ejection process (Stern & Weissman, *Nature*, 2001), 3) the possible galactic environment of the early solar system (Fernández, *Icarus*, 1997), 4) the origin of the Halley-type comets (Levison et al., *AJ*, 2001), and 5) tracking down the actual stars that have or will perturb the Oort cloud (García-Sánchez et al., *AJ*, 1999; *A&A*, 2001). This work was supported by the NASA Planetary Geology & Geophysics and Planetary Astronomy Programs.